

WHAT IS CLAIMED IS:

1. A substrate processing method for processing at least a substrate-to-be-processed held in a processing vessel with a processing gas fed to the substrate, the method comprising the steps of:

feeding the processing gas into the processing vessel to pressurize the atmosphere surrounding the substrate; and

feeding a solvent vapor into the processing vessel while feeding the processing gas.

2. The substrate processing method according to claim 1, further comprising the step of:

stopping feeding the solvent vapor while stopping generating the processing gas, and feeding a base gas of the processing gas into the processing vessel.

3. The substrate processing method according to claim 2, further comprising the step of:

stopping feeding the base gas while exhausting (a) atmospheric gas in the processing vessel.

4. The substrate processing method according to claim 1, further comprising the step of:

adjusting a temperature of the substrate before the processing gas is fed into the processing vessel.

5. The substrate processing method according to claim 4, wherein

in the step of adjusting a temperature of the substrate, a gas having a adjusted temperature is fed to the substrate.

6. The substrate processing method according to claim 1, wherein

the processing gas is ozone gas, and the solvent vapor is steam.

7. The substrate processing method according to claim 6, wherein

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in the step of feeding ozone gas and steam to process the substrate, nitrogen gas is fed into the processing vessel while a feed amount of nitrogen gas is adjusted.

8. The substrate processing method according to claim 7, wherein

the feed amount of nitrogen gas is controlled to be zero.

9. The substrate processing method according to claim 7, wherein

the substrate is a semiconductor substrate having a metal wiring.

10. A substrate processing apparatus for processing at least a substrate-to-be-processed held in a processing vessel with a processing gas fed to the substrate, the apparatus comprising:

a processing gas feed system for feeding the processing gas into the processing vessel;

a solvent vapor feed system for feeding a solvent vapor into the processing vessel;

a central controller for controlling the feed of the processing gas and the solvent vapor to be fed into the processing vessel;

a nitrogen feed pipe for feeding nitrogen gas into the processing vessel; and

a nitrogen gas flow rate controller for controlling nitrogen gas flow rate through the nitrogen gas feed pipe.

11. A substrate processing apparatus according to claim 10, wherein

the processing gas is ozone gas, and the solvent vapor is steam.

12. The substrate processing apparatus according to claim 10, wherein

the nitrogen gas flow rate controller includes a nitrogen

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flow rate control valve.

13. The substrate processing apparatus according to claim 10, comprising:

an interior exhaust system for discharging an atmosphere in the processing vessel; and

an exhaust rate adjusting system for adjusting an exhaust amount of the interior exhaust system.

14. The substrate processing apparatus according to claim 10, wherein

the processing gas feed system can feed ozone gas, or a base gas of ozone gas by actuating or stopping an ozone gas generator included in the processing gas feed system.

15. A substrate processing apparatus for processing at least a substrate-to-be-processed held in a processing vessel with ozone gas fed to the substrate, the apparatus comprising:

an ozone generator for generating ozone gas;

an ozone gas feed pipe interconnecting the ozone gas generator and the processing vessel; and

a steam feed pipe for feeding steam into the processing vessel,

the ozone gas generator being connected to a nitrogen gas feed pipe with a nitrogen gas flow rate control valve inserted in and to an oxygen feed pipe for feeding oxygen.

16. The substrate processing apparatus according to claim 15, wherein

the processing vessel comprises:

a vessel body for holding the substrate;

a vessel cover for opening or closing a loading/unloading opening provided in the upper end of the processing vessel; and

a tight-seal member for sealing a gap between the vessel cover and the vessel body when the vessel cover closes the loading/unloading opening of the vessel body.

17. The substrate processing apparatus according to

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claim 15, wherein

the nitrogen gas feed pipe with the nitrogen gas flow rate control valve inserted in is arranged to feed nitrogen gas directly to the processing vessel, in place of being connected to the ozone gas generator.

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